ASSOCIATION OF PERSONALITY WITH ADOLESCENT DELINQUENCY IN A CONTEXT OF DEVIANT SOCIALIZATION

Kaisla Johanna Komulainen
Pro gradu -tutkielma
Psykologia
Käyttäytymistieteiden laitos
Helsingin yliopisto
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Ohjaaja: Markus Jokela

HELSINGIN YLIOPISTO – HELSINGFORS UNIVERSITET – UNIVERSITY OF HELSINKI

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Käyttäytymistieteellinen tiedekunta	Käyttäytymistieteiden laitos

Tekijä – Författare – Author

Kaisla Johanna Komulainen

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Tiivistelmä – Abstrakt – Abstract

Nuorisorikollisuus on psykologisesti ja yhteiskunnallisesti keskeinen aihe. Aiemmin on havaittu sekä kaverien rikollisuuden ja yksilön kriminogeenisten asenteiden että persoonallisuuspiirteiden olevan yhteydessä rikoskäyttäytymiseen. Näiden tekijöiden keskinäisiä vaikutuksia on kuitenkin tutkittu vain vähän. Tässä tutkimuksessa tarkastellaan viiden suuren persoonallisuuspiirteen yhteyttä nuorisorikollisuuteen rikollisen sosialisaation näkökulmasta. Kiinnostuksen kohteena on erityisesti se, (1) medioivatko ja/tai (2) moderoivatko kaverien rikollisuus ja kriminogeeniset asenteet yhteyttä persoonallisuuden ja rikoskäyttäytymisen välillä.

Tutkimuksen aineisto käsitti Nuorisorikollisuuskysely 2012 -poikkileikkaustutkimuksen 14-17-vuotiaat vastaajat (*n*=4855). Rikollisuusmuuttuja muodostettiin 17 eri rikoskäytöksen frekvenssiä koskeneista vastauksista, jotka skaalattiin graded response -mallin avulla. Kaverien rikollisuutta ja asenteita mittaavat muuttujat muodostettiin itsearviointivastausten perusteella. Kriminogeenisia asenteita arvioitiin kahdella muuttujalla: rikollisuudelle suotuisilla ja neutraloivilla asenteilla. Persoonallisuusmittarina käytettiin 15 osion BFI-S-kyselyä. Mediaatiopolkuja tarkasteltiin rakenneyhtälömallilla ja moderaatiovaikutuksia lineaarisella regressioanalyysilla.

Rikoskäyttäytyminen oli yhteydessä korkeampaan ulospäinsuuntautuneisuuteen sekä matalampaan sovinnollisuuteen, tunnollisuuteen ja neuroottisuuteen. Kaverien rikollisuus ja kriminogeeniset asenteet osittain medioivat ulospäinsuuntautuneisuuden, sovinnollisuuden ja tunnollisuuden yhteyksiä rikoskäyttäytymiseen. Kriminogeeniset asenteet medioivat täysin neuroottisuuden ja rikoskäyttäytymisen välisen yhteyden. Kaverien rikollisuus voimisti matalan neuroottisuuden, matalan sovinnollisuuden ja matalan tunnollisuuden yhteyksiä rikoskäyttäytymiseen. Kriminogeeniset asenteet puolestaan voimistivat korkean ulospäinsuuntautuneisuuden ja matalan sovinnollisuuden yhteyksiä rikoskäyttäytymiseen.

Tulokset osoittavat, että persoonallisuus voi tuoda uutta tietoa nuorisorikollisuuden etiologiasta rikollisen sosialisaation kontekstissa. Persoonallisuusnäkökulman merkitystä käsitellään lopuksi preventio-/interventiotoimien kannalta.

Avainsanat – Nyckelord – Keywords

nuorisorikollisuus, persoonallisuus, kaverien rikollisuus, asenteet

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HELSINGIN YLIOPISTO – HELSINGFORS UNIVERSITET – UNIVERSITY OF HELSINKI

Tiedekunta – Fakultet – Faculty	Laitos – Institution – Department
Faculty of Behavioural Sciences	Institute of Behavioural Sciences

Tekijä – Författare – Author

Kaisla Johanna Komulainen

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Tiivistelmä – Abstrakt – Abstract

Adolescent delinquency is a prevalent concern, which carries with psychological and societal costs. Deviant peer affiliation and criminogenic attitudes, as well as personality traits are known to be associated with delinquency, but their interlinked effects are less studied. The present study examines the role of personality in a deviant socialization context. Specifically, I examine whether peer deviance and criminogenic attitudes (1) mediate and/or (2) moderate the associations of the Five-Factor Model personality traits with delinquency.

The data included respondents (n=4855) to the cross-sectional Finnish Self-Report Delinquency Study 2012, aged 14-17 years. Delinquency was assessed on the basis of 17 different deviant behaviors; the reported frequencies of engaging in each of them were scaled using a graded response model. Peer deviance and criminogenic attitudes were assessed via respondents' self-reports; two distinct attitudinal indicators (deviant and neutralizing attitudes) were included. Personality was assessed with a 15-item BFI-S questionnaire. A structural equation model was conducted to examine the mediation pathways. The moderation effects were examined with linear regression analysis.

Delinquency was associated with higher extraversion, lower agreeableness, lower conscientiousness, and lower neuroticism. Peer deviance and criminogenic attitudes partially mediated the associations of extraversion, agreeableness, and conscientiousness with delinquency. The association between neuroticism and delinquency was fully mediated via criminogenic attitudes. Peer deviance strengthened the associations of low neuroticism, low agreeableness, and low conscientiousness with delinquency. Deviant and neutralizing attitudes strengthened the associations of high extraversion and low agreeableness with delinquent conduct.

The findings suggest that personality may provide novel insights into the etiology of delinquency in a context of deviant socialization. Implications of the personality-based approach and directions for further research are discussed.

Avainsanat – Nyckelord – Keywords

adolescent delinquency, personality, deviant peer affiliation, attitudes

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1 INTRODUCTION

The prevalence of delinquency peaks sharply during adolescence (Dahlberg, 2001; Gottfredson & Hirschi, 1990; Jeglum Bartusch, Lynam, Moffitt, & Silva, 1997; Kivivuori, 2006; Moffitt, 1993). In Finland in 2005, adolescent offenders committed over 20% of the criminal code violations (Kivivuori, 2006). In 2012, a nationwide survey found that more than half of Finnish 9th graders had committed at least one delinquent act during the past 12 months, and 21% had engaged in at least three different types of delinquent acts (Salmi, 2012). To a certain degree researchers regard delinquency as an age-normative phenomenon (e.g., Salmi, 2004); Moffitt (1993) even argues that delinquency *becomes* the norm during adolescence. At the same time, it is a prevalent risk factor for an adolescent's psychosocial adjustment and later development (e.g., Aguilar, Sroufe, Egeland, & Carlson, 2000; Dryfoos, 1990; Gleason, Jensen-Campbell, & Richardson, 2004; Windle & Mason, 2004). Delinquency is also likely to adversely affect other people (Dryfoos, 1990; McCollister, French, & Fang, 2010), and it carries societal costs (Cohen, 1998; McCollister et al., 2010; Olsson, 2013). It is clear that delinquency is a relevant concern.

Affiliation with deviant peers is one of the most prominent risk factors of adolescent delinquency. Delinquent youth typically offend in groups (Reiss, 1986; Warr, 2002) and evidence from both longitudinal and intervention studies points to the role of deviant peers in predicting deviant behavior (see e.g., Dishion & Patterson, 2006; Dishion, Spracklen, Andrews, & Patterson, 1996; Dodge, Dishion, & Lansford, 2006; Gifford-Smith, Dodge, Dishion, & McCord, 2005; see also Kandel, 1978). Related lines of research highlight the fact that adolescents may adopt criminogenic attitudes, which may in part reflect the socializing influence of deviant peers (e.g., Akers, Krohn, Lanza-Kaduce, & Radosevich, 1979; Akers, 2009; see also Kandel, 1978; Moffitt, 1993) and are linked to delinquency, particularly in adolescent/adult samples (Pratt et al., 2010).

But the effects of these risk factors are not the same for all individuals. Individual differences may directly affect the risk of delinquency (e.g., Gottfredson & Hirschi, 1990; Jones, Miller, & Lynam, 2011; Miller & Lynam, 2001; Moffitt, 1993); moreover, they may index a reaction range (e.g., Nigg, 2006), which may uniquely result in delinquency in

specific at-risk circumstances. For example, individual differences may affect the likelihood that an individual affiliates with delinquent peers or adopts criminogenic attitudes (e.g., Longshore, Chang, & Messina, 2005; Longshore, Chang, Hsieh, & Messina, 2004; Wright, Caspi, Moffitt, & Silva, 2001). Also, they may determine how the individual responds to these factors, that is, if he/she responds with delinquent behavior (e.g. Wright et al., 2001; see also Svensson, Pauwels, & Weerman, 2010; Wikström & Svensson, 2010).

To date, criminological research has examined these associations with a predominant focus on low self-control. Self-control has cogently been claimed as "one of the strongest known correlates of crime" (Pratt & Cullen, 2000, p. 952), and several lines of research have shown it to operate in various at-risk contexts (e.g., Hay & Forrest, 2008; Wright et al., 2001; Zimmermann, Botchkovar, Antonaccio, & Hughes, 2015). However, some have argued that self-control might not detect the individual determinants of delinquency in sufficient detail (e.g., Burt, Sweeten, & Simons, 2014; Caspi et al., 1994; see also Jones & Lynam; 2008; Marcus, 2004). Despite the potential importance of personality, mainstream criminology has made few attempts to account for it (Jones et al., 2011). In this study, I examine the association of the Five-Factor Model of personality with delinquency in a context of deviant socialization. Specifically, I examine the ways that deviant peers and attitudes may translate personality-based risks into deviant behavior.

1.1 Criminological perspectives on delinquency

Two criminological theories are specifically relevant in setting the context for the present study. Akers et al. (1979) developed central criminological notions of peers and attitudes in their social learning theory, while the general theory of crime defines the concept of self-control (Gottfredson & Hirschi, 1990). Both perspectives have been found empirically relevant, and I review them briefly.

The main premise of the social learning theory (Akers et al., 1979; Burgess & Akers, 1966) is that people learn delinquency through social interaction. The prerequisite for learning is *differential association* (see Sutherland & Cressey, 1947), which refers to the ways that individuals identify and interact with different social groups (Akers et al., 1979). Akers et al. (1979) argues that these groups provide an individual with behavioral models

to *imitate*, and *reinforce* specific behaviors over others. By these means, they shape normative definitions, i.e. each individual's own attitudes attached to different behaviors, which function as discriminative stimuli toward either deviance or resistance to it. According to Akers et al. (1979; Akers, 2009), the criminogenic attitudes may be *positive,* i.e., *deviant/pro-criminal*; that is, they may define criminal behavior as desirable or completely acceptable. Or they may be *neutralizing* (see also Kivivuori, 1997; Sykes & Mazda, 1957); that is, they may excuse or justify criminal behavior though the individual recognizes it as undesirable. Hence, they do not necessarily require the individual to adopt explicitly oppositional values or to affiliate with an explicitly deviant subculture (Akers, 2009). According to Akers et al. (1979; Akers, 2009), the attitudes may stem from any socializing context, but differential association with a peer context plays a central role during adolescence.

In contrast, the self-control theory (Gottfredson & Hirschi, 1990) discards the role of contextual factors. Gottfredson and Hirschi (1990) argue that the only relevant cause of crime is low self-control, which they say is manifested as "impulsive, insensitive, physical (as opposed to mental), risk-taking, short-sighted, and non-verbal" behavior (p. 90). In essence, they say, self-control refers to an individual's ability to think of the consequences of his or her behavior in the face of immediate rewards and to inhibit behaviors that might lead to negative outcomes. They argue that the level of self-control is fixed in childhood, and remains stable after that. They further contend that crime causally precedes the influence of any sociological variables. Specifically, they claim that any observed associations between social learning and crime are due to spurious selection effects, i.e., delinquent individuals flocking together (Gottfredson & Hirschi, 1990).

Despite the rivalry between the classical schools, both perspectives are clearly based on empirical evidence. Although researchers have used different measures of self-control, they have found a profoundly robust association between low self-control and criminal behavior (Pratt & Cullen, 2000). However, the most radical overstatements of the original theory have been recognized: the effects of self-control have not been found to render insignificant the effects of rivaling social-level variables, not delinquent peers nor attitudes (e.g., Evans, Cullen, Burton, Dunaway, & Benson, 1997; Pratt & Cullen, 2000). These variables—affiliation with deviant peers and criminogenic attitudes—are independent correlates of delinquency, and both have been found to exert specifically robust effects in

adolescent samples (Pratt & Cullen, 2000; Pratt et al., 2010). In the present study, I focus on these two social learning constructs: i.e., differential association and criminogenic attitudes. Specifically, I define deviant socialization (DS) in terms of three variables derived from the social learning theory: (1) deviant peer affiliation, (2) deviant attitudes, and (3) neutralizing attitudes.

1.2 Integrating the perspectives

At present, the perspectives of social learning and self-control are recognized as transactional, not contradicting (see Evans et al., 1997). Criminological studies mostly focus on integrative designs that examine the conjoint effects of self-control and contextual factors. Studies in the DS context have tested two main hypotheses. First, researchers have hypothesized that deviant peers and criminogenic attitudes can mediate the association of low self-control with delinquency; that is, the association between self-control and delinquency may be due in part to the effects of deviant peer affiliation and/or criminogenic attitudes. Second, self-control has been expected to interact with these DS factors so that the associations of deviant peers and attitudes with delinquency vary according to individual's level of self-control.

Several longitudinal studies have provided evidence that affiliation with deviant peers partially mediates the association of low self-control with deviant behavior (Chapple, 2005; Wright et al., 2001; see also Mason & Windle, 2002). Studies with cross-sectional designs have obtained similar results (Holt, Bossler, & May, 2011; Longshore et al., 2004). In a cross-sectional design, Longshore et al. (2005) found that deviant attitudes mediate the association of low self-control with criminal behavior, but failed to find a mediating association via deviant peers (but see Longshore et al., 2004). In addition, a recent cross-sectional study (Burruss, Bossler, & Holt, 2012) found an indirect association between low self-control and cybercrime through a composite social learning index.

Studies examining the interaction effects have obtained less conclusive results. The effect of deviant peer affiliation has been found to intensify among individuals who have either low (Holt et al., 2011; Wright et al., 2001; see also Gibson & Wright, 2001) or high self-control (Hinduja & Ingram, 2008; Meldrum, Young, & Weerman, 2009; see also Thomas

& McGloin, 2013; Vitulano, Fite, & Rathert, 2009), while a recent study (Yarborough, Jones, Sullivan, Sellers, & Cochran, 2012), found no interaction effect between deviant peers and self-control. Yarborough et al. (2012) also failed to observe an interaction between self-control and delinquent attitudes, but other researchers have found that low self-control exerts stronger effects on delinquency among individuals with low law-relevant morale compared to those with high morale (Svensson et al., 2010; Wikström & Svensson 2010). Here, the measurement of morale corresponds to common measures of criminogenic attitudes, providing evidence that self-control also interacts with attitudes.

1.3 Personality and delinquent behavior

In sum, several lines of evidence indicate that the transactions between self-control and the DS factors are relevant to the etiology of delinquency. However, some have questioned the precision of the self-control construct itself. The unidimensional measures of self-control have been criticized for being oversimplifying and lacking detail (Caspi, et al., 1994). They have failed to demonstrate an empirically unidimensional structure (e.g., Burt et al., 2014; DeCamp, 2015; Delisi, Hochstetler, & Murphy, 2003; Ward, Nobles, & Fox, 2014; Wood, Pfefferbaum, & Arneklev, 1993; see also Arneklev, Grasmick, Tittle, & Bursik, 1993; Lynam & Miller, 2004; Whiteside & Lynam, 2001), provoking arguments that a definite measure of criminal propensity should involve several psychological dimensions (Burt et al., 2014; see also Caspi, et al., 1994; Miller & Lynam, 2001). In addition, critics have questioned whether the self-control construct remains stable over time (e.g., Burt, Simons, & Simons, 2006; Burt et al., 2014; Meldrum, Young, & Weerman, 2012). Moreover, Pratt and Cullen's meta-analysis (2000) found that the effects of self-control are significantly weaker in longitudinal than cross-sectional samples.

Here, several scholars propose personality as a promising avenue for criminological research (e.g., Caspi et al., 1994; Jones et al., 2011; Miller & Lynam, 2001). Personality refers to individuals' characteristic ways of thinking, feeling, and behaving, which are partly genetically based (e.g., Tellegen et al., 1988), and remarkably stable across time (e.g. Costa & McCrae, 1997; Roberts & DelVecchio, 2000). In psychology, the most widely accepted and validated framework for the study of personality is the Five Factor Model of personality (FFM, also referred to as the Big Five; John, Naumann, & Soto,

2008), which describes personality using five main trait dimensions: *extraversion* (reflecting characteristics such as sociability, social assertiveness, gregariousness, and proneness to positive emotions), *neuroticism* (e.g., anxiousness, impulsiveness, stress-vulnerability, proneness to negative emotions), *agreeableness* (e.g., trust, altruism, modesty, cooperation in interpersonal relationships), *conscientiousness* (e.g., self-discipline, dutifulness, reliability, adherence to conventional norms) and *openness* (e.g., curiosity, imagination, aesthetic interests). The FFM framework assumes that the dimensions are independent, that they capture individual variation in several lower-order dispositions (*facets*), and that they set up a description of individual personality as a profile based on scores on each dimension (John et al., 2008; McCrae & Costa, 2008).

Although mainstream criminological scholars have mostly ignored personality, psychological researchers have documented salient associations of personality with externalizing and antisocial behaviors (Jones et al., 2011). Two meta-analyses (Jones et al, 2011; Miller & Lynam, 2001) have concluded that low agreeableness, low conscientiousness, and high neuroticism are the most robust FFM correlates of antisocial behavior. Furthermore, these FFM traits have been found to correlate with general measures of self-control (O'Gorman & Baxter 2002; Tangney, Baumeister, & Boone 2004) and agreeableness and conscientiousness, in particular, have been developmentally linked to an individual's capacity for self-regulation (e.g., Ahadi & Rothbart, 1994; Cumberland-Li, Eisenberg, & Reiser, 2004; Halverson et al., 2003; Jensen-Campbell, Roselli, et al., 2002; see also Digman, 1997; Rothbart & Bates, 1998).

In addition, researchers argue that the same dispositions—high neuroticism, low agreeableness and low conscientiousness—tap into the self-control theory's description of the phenotypic expression of low self-control (Gottfredson & Hirschi, 1990; Jones et al., 2011; Miller & Lynam, 2001). Personality, however, provides information with a multidimensional grasp (e.g., Miller & Lynam, 2001), and is notably stable across time (e.g. Costa & McCrae, 1997; Roberts & DelVecchio, 2000). Building on a critical conception of self-control, scholars have argued that personality might be, or clearly is, a relevant factor in teasing out the etiology of delinquency (e.g., Caspi et al., 1994; Jones et al., 2011; Miller & Lynam, 2001; see also Miller, Lynam, & Leukefeld, 2003)

A direct research question arising from this argument is whether personality informs the transactional hypotheses, which are currently the predominant focus of criminological research (see Jones et al., 2011; Miller & Lynam, 2001). To date, personality has rarely been included in integrative study designs using contextual variables (but see e.g., Jones & Lynam, 2008). In particular, virtually no research has been conducted that examines the FFM personality in a DS context.

Still, a few related accounts have provided tentative evidence that personality plays a role in a deviant peer ecology. An Australian study, with two samples of high school boys (*n*=151, *n*=169) (Heaven, Caputi, Trivellion-Scott, & Swinton, 2000), found that deviant companionship and deviant behavioral norms partially mediate the association between Eysenckian psychoticism[1] and delinquency. Given the argument that psychoticism taps into impulsivity (e.g., Eysenck, 1992; Eysenck & Eysenck, 1985), and that it blends elements of low FFM agreeableness and conscientiousness (Costa & McCrae, 1995), the results suggest personality might be associated with delinquency via somewhat similar DS pathways as self-control. A Dutch longitudinal study of 497 early adolescents (Yu, Branje, Keijsers, Koot, & Meeus, 2013) found an interaction effect between an individual's personality type and exposure to peer delinquency. Yu et al. (2013) found that such exposure was associated with an increased risk of delinquency among *overcontrollers*, i.e. those scoring low on extraversion and high on neuroticism, compared to *undercontrollers*, who scored low on agreeableness and conscientiousness, and *resilients*, who scored moderate or high on all FFM traits. A prospective study conducted in Alabama, in the United States with 704 early adolescents (Mrug, Madan, & Windle, 2012), found a similar interaction effect between specific temperament dimensions and peer deviance. They found that individuals with low task orientation, those with low positive mood, and males with low flexibility were specifically susceptible to deviant peer influence.

1.4 The present study

In sum, emerging evidence exists to suggest that personality plays a role in the context of deviant socialization. However, the results so far are inconclusive, and cannot be directly

[1] Based on the P-E-N (psychoticism, extraversion, neuroticism) model of personality (e.g., Eysenck & Eysenck, 1970, 1976).

compared, due to differences in measurement. In addition, no attempt has been made to relate these results to the research literature that is still mostly focused on self-control.

The present study builds on the prior evidence on self-control to examine the role of personality in the development of delinquency. Specifically, I set out to examine how the FFM personality traits and three indicators of deviant socialization, i.e., deviant peer affiliation, deviant attitudes, and neutralizing attitudes are associated with delinquency. Together, the attitudinal indicators are referred to as criminogenic attitudes. Three questions are central to the analysis:

1. How are the FFM traits associated with delinquency?
2. To what extent, if any, is the association between the FFM traits and delinquency mediated by deviant peer affiliation and criminogenic attitudes?
3. Do the FFM traits interact with deviant peer affiliation, and with criminogenic attitudes?

I hypothesized that high neuroticism, low agreeableness and low conscientiousness tap into key aspects of low self-control. Thus, in line with prior findings, I propose three hypotheses.

1. Higher neuroticism, lower agreeableness and lower conscientiousness are associated with higher delinquency.
2. The associations of delinquency with neuroticism, agreeableness and conscientiousness are mediated by deviant peer affiliation and criminogenic attitudes.

2.1. Higher levels of affiliation with deviant peers, and more deviant and neutralizing attitudes, are associated with higher levels of delinquency.

2.2. Higher neuroticism, lower agreeableness and lower conscientiousness are associated with higher levels of deviant peer affiliation, and with more deviant and neutralizing attitudes.

3. Neuroticism, agreeableness and conscientiousness interact with peer deviance, and deviant and neutralizing attitudes. Here I propose no hypothesis on the direction of the interaction.

2 METHODS

2.1 Sample

The data included respondents to the Finnish Self-Report Delinquency Study 2012 (FSRD-12, Nuorisorikollisuuskysely 2012; Salmi, 2012), a cross-sectional survey conducted in 2012 by the National Research Institute of Legal Policy in Finland. The study was administered online among a representative sample of Finnish 6th and 9th graders, to gather information concerning delinquency and experiences of victimization via students' self-reports. In addition, the FSRD-12 included items addressing the respondents' wider experiences of the social context (e.g., neighborhood, family and peer environments) as well as more proximal factors such as attitudes and personality.

Cluster sampling was used to choose 102 lower elementary and 51 upper elementary schools from a population of the Finnish-speaking schools in Finland. The final sample included 8,500 students. At the school level, the sampling took into account different types of counties and school sizes (i.e., proportional to the size sampling). Given that a fairly mature level of moral reasoning was required for students to make eligible observations on the variables of interest (see also Pratt et al., 2010), only the 9th grade students were included in the present study. The data for the 9th graders was collected during February, March and April of 2012, with a response rate of 80%. All person-observations were valid for the analyses, and there were no missing values due to the forced-choice design.

In the final sample (n=4855), gender was evenly distributed, with 51% girls. The age of the respondents ranged between 14 and 17 years, with a median of 15. Most respondents (97.4%) were born in Finland; the most common countries of origin for those born abroad were Russia, Estonia and the United Kingdom. The majority of respondents perceived their family's socioeconomic status as being average or slightly above or below the average (46.8%, 18.8%, and 15.2% respectively).

2.2 Measures

2.2.1 Delinquency. Delinquency was assessed on the basis of 17 survey items that asked respondents how often they engaged in specific delinquent acts, such as stealing, fighting, carrying a weapon, bullying, and skipping school, during the last 12 months; the list is included in the Appendix A. The responses were recoded into four groups based on the reported frequencies: 0 (0 times), 1 (1-2 times), 2 (3-5 times), and 3 (6 times or more). To compute a composite measure of delinquency, I scaled the scores on the different behavioral items by using a graded response model (Samejima, 1969), which is applicable for ordinal polytomous data in the Item Response Theory (IRT) approach. The graded response model scaling places the reported frequencies on a shared interval-level scale, using the information about different intervals across (varying offence seriousness) and within the items (varying importance of a unit increase on the item scales) (Osgood, McMorris, & Potenza, 2002). Even though the scaling normalized the score distribution, the delinquency variable remained highly skewed; to further normalize the distribution of residuals, it was square root transformed. The graded response model was computed by using R version 3.0.2.

2.2.2 Personality. The FFM personality traits were assessed using a 15-item BFI-S questionnaire, a shortened version of the 44-item Big Five Inventory (BFI; John, Donahue, & Kentle, 1991). The Finnish translation of the BFI-S (Jokela, Janhunen, & Kivivuori, 2011) has not been validated, but in a German sample, it was found to demonstrate acceptable internal consistency, stability over time, convergent validity with respect to the 240-item NEO-PI-R (Costa & McCrae, 1992a; 1992b), and discriminant validity (Hahn, Gottschling, & Spinath, 2012; see also Lang, John, Lüdtke, Schupp, & Wagner, 2011).

The BFI-S measures each FFM trait with three indicator items, to which the answers were provided on a 5-point scale (the items are listed in the Appendix B). The final scales for each trait were computed by summing the scores on the indicator items, four of which were reversed. In the present study, the scales demonstrated reasonable internal consistency for extraversion (Cronbach's alpha 0.73), neuroticism (0.63), conscientiousness (0.54) and openness (0.61). The internal consistency of the agreeableness variable remained low (0.37), likely due to problems with the inverted item

"I'm sometimes somewhat rude to others." However, all the items were retained on the scale to ensure comparability.

2.2.3 Deviant socialization. Deviant socialization was assessed using three indicators derived from the social learning theory: (1) deviant peer affiliation, (2) deviant attitudes and (3) neutralizing attitudes. Each indicator scale was composed as a simple sum of the scores on the indicator-related items in the survey. To check the psychometric properties of the scales, I ran an unrotated maximum likelihood factor analysis on the items of each scale. Cronbach's alpha was used as a reliability estimate for internal consistency.

Deviant peer affiliation. Respondents' level of affiliation with deviant peers was assessed by their responses to three items ("Has your friend ever used marijuana/hash," "Has your friend ever stolen from a store," and "Has your friend ever fought in a public place") on a 3-point scale (1 = none of my friends, 2 = one friend, 3 = more than one friend). The scores were recoded to range from 0 to 2, so that the composite score ranged between 0 and 6, greater values indicating greater affiliation with deviant peers. The items loaded on one factor with loadings 0.73, 0.78 and 0.80 respectively, with three initial Eigenvalues of 2.18, 0.44 and 0.38. The internal consistency of the scale was good (α=0.81).

Deviant attitudes. The scale assessing deviant attitudes included five deviant behavior items, and the respondents were asked to rate the wrongness of the acts described, i.e., "lie to adults such as parents," "hurt other people on purpose," "download illegal music or movies," "steal something small from a store," and "hit a person to hurt him/her." Items were rated on a 4-point scale (1 = not wrong at all, 4 = very wrong). The scaling was reversed so that greater values indicated more deviant attitudes, and the total score ranged from 5 to 20. The items loaded on one factor with loadings 0.61, 0.67, 0.45, 0.69 and 0.74 respectively, with initial Eigenvalues of 2.61, 0.91 and 0.59. The internal consistency of the scale was good (α=0.77).

Neutralizing attitudes. The measure for neutralizing attitudes included four items presenting neutralizing statements that respondents might use to downplay negative evaluations of delinquent behavior, such as "Adolescent delinquency is minor compared to white-collar crime," "It is normal for a young person to act illegally at times," "It is acceptable to pay back if somebody hurts my friend," and "If I stole something, my friends

would accept that."). A fifth item ("Youth who are breaking the law are expressing their psychological distress") was excluded because of its low factor loading (0.08) in the factor analysis of the total scale. Items were rated on a 5-point scale (1 = completely agree, 5 = completely disagree). The scaling was reversed so that greater values indicated more neutralizing attitudes, and the total score ranged from 4 to 20. The four items loaded on one factor with loadings 0.59, 0.64, 0.63 and 0.61 respectively, and with initial Eigenvalues 2.14, 0.66 and 0.62. The internal consistency of the scale was good (α=0.71).

2.2.4 Confounding variables. All analyses were adjusted for sex and age. Sex was coded as a dichotomous variable (0 = female, 1= male). Outliers (under 14, and over 17) on the age variable were replaced with the sample's mean age (15.25).

2.3 Statistical analyses

All the variables, except sex and age, were standardized into *z*-scores (mean 0, standard deviation (SD) 1) before entering them into the analysis, to facilitate the interpretation of effect sizes and interactions, and to address the possibility of multicollinearity. Cohen's *d* was used as an effect size estimate. *D* was calculated for the difference between high (1 SD above the mean) and low (1 SD below the mean) levels of delinquency; with all the variables standardized, *D* equals 2 x the *B*-coefficient of each independent variable (see Gelman, 2008). Cross-sectional sample weights (computed by Statistics Finland, Tilastokeskus) were used in all analyses to take into account the systematic differences between respondents at the cluster level of sampling (i.e., in different schools), along with non-responses.

2.3.1 Analysis of main effects and interactions. The main effects of personality and the interactions between personality and the DS indicators were examined with linear regression analysis. The associations of the FFM traits with delinquency were analyzed by fitting five univariate (i.e. trait-specific) regression models, and a composite model adjusted for all traits. The interaction models were fitted separately for each DS indicator to assess whether similar patterns of interaction would be observed across them. First, five models were adjusted for single trait-specific interactions. Then, to determine their independence, a sixth model was adjusted for all the interactions that were observed as

significant in the trait-specific analyses. The significant interactions were examined in detail by conducting a slope analysis; that is, the regression *B*-coefficients for the associations between the FFM traits and delinquency were calculated at high (1 SD above the mean) and low (1 SD below the mean) levels of each DS indicator. The results for the regression models were reported as regression *B*-coefficients, and their 95% confidence intervals (CIs). A *p*-value of 0.05 was considered statistically significant. These analyses were performed using SPSS Statistics 21 software.

2.3.2 Analysis of mediation pathways. The mediation effects were assessed by fitting a maximum likelihood structural equation model (SEM) for the pathways flowing from the FFM personality to delinquency through the three DS indicators. The mediators were included in the model simultaneously. All the variables were modeled as continuous manifest variables. The residual covariances of the mediators, along with the paths between the covariates (i.e., sex and age) and the mediators were freed for estimation. The results of the path analysis were reported as regression *B*-coefficients and their standard errors (SE). A *p*-value of 0.05 was considered statistically significant. The mediation proportions (i.e., the percentage of the association of each trait with delinquency that is explained by the mediators) were determined by dividing the mediated (indirect) effect of each trait by the total effect (indirect + direct) of the trait on delinquency (Ditlevsen, Christensen, Lynch, Damsgaard, & Keiding, 2005). The mediation analysis was conducted using R version 3.0.2.

2.4 Power analysis

Given the sample size of this study (n=4855), the present analysis will detect an effect size of 0.007 in the mediation analysis, and an effect size of 0.004 in the moderation analysis with a power of 90% at $p<0.05$ in a two-tailed test. The power analysis was conducted using R version 3.0.2.

3 RESULTS

Table 1 displays the descriptive statistics and bivariate correlations for the main study variables. The attitude variables were strongly correlated, and they were both associated with deviant peer affiliation, lower agreeableness and lower conscientiousness. Agreeableness and conscientiousness correlated relatively strongly with each other. All DS indicators were strongly correlated with the measure of delinquency.

Table 1
Descriptive statistics and zero-order correlations between the study variables.

	Mean (SD)	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Delinquency	0.93 (0.41)	-								
2. Extraversion	10.89 (2.60)	0.15	-							
3. Neuroticism	9.45 (2.55)	-0.07	-0.16	-						
4. Agreeableness	10.33 (1.92)	-0.25	0.09	0.00	-					
5. Conscientiousness	9.71 (2.17)	-0.32	0.09	0.00	0.31	-				
6. Openness	10.86 (2.34)	-0.03	0.24	0.13	0.20	0.19	-			
7. Peer deviance	2.53 (2.19)	0.55	0.21	-0.05	-0.14	-0.20	0.05	-		
8. Deviant attitudes	11.21 (3.02)	0.38	-0.04	-0.18	-0.27	-0.33	-0.21	0.29	-	
9. Neutralizing attitudes	12.22 (3.36)	0.38	0.03	-0.12	-0.23	-0.30	-0.14	0.34	0.58	-

The correlations of ≥ |0.04| are statistically significant at $p<0.01$ and ≥ |0.03| at $p<0.05$.
SD, standard deviation.

3.1 Associations of personality with delinquency

As shown in Table 2 (in a model adjusted for all personality traits), delinquency was associated with higher extraversion, lower neuroticism, lower agreeableness and lower conscientiousness. Openness was not associated with delinquency. Conscientiousness demonstrated the greatest effect size (d=0.57). The respective effect sizes were somewhat smaller for extraversion (d=0.38) and agreeableness (d=0.36), and weak for neuroticism (d=0.06). See Appendix C (Table C1) for the univariate associations between each personality trait and delinquency.

Table 2
Associations between the FFM personality traits and delinquency

	β	95% CI	
Extraversion	0.19***	0.16	0.22
Neuroticism	-0.03*	-0.06	0.00
Agreeableness	-0.18***	-0.21	-0.15
Conscientiousness	-0.28***	-0.31	-0.26
Openness	0.03	0.00	0.05

***p<0.001, *p<0.05. β, regression B-coefficient; CI, confidence interval.

3.2 Mediation pathways

The results of the path analysis are shown in Table 3. The paths were tested in a saturated model. All three of the mediator variables —deviant peer affiliation (*B*=0.42, SE=0.02, *p*<0.001), deviant attitudes (*B*=0.13, SE=0.02, *p*<0.001) and neutralizing attitudes (*B*=0.10, SE=0.02, *p*<0.001)— were associated with higher delinquency. The direct pathways from extraversion (*B*=0.07, SE=0.01, *p*<0.001), agreeableness (*B*=-0.10, SE=0.01, *p*<0.001) and conscientiousness (*B*=-0.15, SE=0.01; *p*<0.001) to delinquency remained statistically significant when the DS indicators were added to the model. The direct pathway from neuroticism to delinquency did not remain significant (*B*=-0.02, SE=0.01, *p*=0.170).

Higher extraversion, lower agreeableness and lower conscientiousness were associated with higher deviant peer affiliation, and more deviant and neutralizing attitudes. Lower neuroticism was associated with more deviant and neutralizing attitudes, but not with peer deviance. On standardized measures, extraversion was more strongly associated with deviant peer affiliation than with either attitudinal variable. For agreeableness and conscientiousness, the pattern was the opposite: they were more strongly associated with both deviant and neutralizing attitudes than with deviant peer affiliation (Table 3).

All indirect pathways from personality to delinquency were statistically significant except for the pathway from neuroticism to delinquency through peer deviance. The mediation proportions for each trait are presented in the rightmost column in Table 3. The DS variables explained 62% of the association between extraversion and delinquency, 48% of the association between conscientiousness and delinquency, and 44% of the association

Table 3
Path analysis of the mediation effects in the association of FFM personality and delinquency

	FFM trait - DS		DS - delinquency		Direct / indirect pathways		Mediation proportion
	β	SE	β	SE	β	SE	
Extraversion					0.073***	0.014	
Peer deviance	0.244***	0.017	0.421***	0.016	0.103***	0.008	
Deviant attitudes	0.032*	0.016	0.130***	0.019	0.004*	0.002	62%
Neutralizing attitudes	0.095***	0.016	0.104***	0.016	0.010***	0.002	
Neuroticism					-0.019	0.014	
Peer deviance	0.019	0.018			0.008	0.008	
Deviant attitudes	-0.101***	0.017			-0.013***	0.003	34%
Neutralizing attitudes	-0.050**	0.017			-0.005**	0.002	
Agreeableness					-0.102***	0.014	
Peer deviance	-0.105***	0.017			-0.044***	0.007	
Deviant attitudes	-0.161***	0.017			-0.021***	0.004	44%
Neutralizing attitudes	-0.132***	0.017			-0.014***	0.003	
Conscientiousness					-0.146***	0.014	
Peer deviance	-0.189***	0.017			-0.079***	0.008	
Deviant attitudes	-0.245***	0.016			-0.032***	0.005	48%
Neutralizing attitudes	-0.246***	0.016			-0.025***	0.004	
Openness					0.023	0.014	
Peer deviance	0.054**	0.018			0.023**	0.008	
Deviant attitudes	-0.108***	0.018			-0.014***	0.003	8%
Neutralizing attitudes	-0.064***	0.017			-0.007**	0.002	

***p<0.001, **p<0.01, *p<0.05. DS, deviant socialization, β, regression B-coefficient, SE, standard error. Note: Peer deviance, deviant attitudes and neutralizing attitudes were fitted in the path analysis as the hypothetical mediators. The first column gives the regression B-coefficients and their standard errors for the paths from the personality traits to the mediators, the second for the paths from the mediators to delinquency, and the third for the direct and indirect pathways from personality to delinquency. The rightmost column presents the mediation proportions, i.e., the part of the association of each trait with delinquency flowing via the mediators, i.e., the indirect effect divided by the total effect (B= -0.277, SE= 0.033). The paths were tested in a saturated model.

between agreeableness and delinquency. For neuroticism, the corresponding mediation proportion was 34%. (Note that this estimate includes the non-significant positive association between neuroticism and deviant peer affiliation.)

Deviant peer affiliation was the dominant mediator; with the exception of neuroticism, the complete mediation pathways through peer deviance were significantly stronger than the pathways through either of the attitude variables. In addition, the mediation pathways through deviant attitudes were slightly stronger than those via neutralizing attitudes for all traits except extraversion. For extraversion, the relative strengths were the opposite: the pathway via neutralizing attitudes was stronger than the one via deviant attitudes (Table 3).

3.3 Interaction effects between personality and deviant socialization

The results of the final interaction models, i.e., those adjusted for all significant personality x DS interactions, are presented in Table 4. The preceding trait-specific interaction analyses are presented in the Appendix C (Tables C2–C4).

3.3.1 Personality x peer deviance. In trait-specific interaction analyses (Appendix C, Table C2) deviant peer affiliation interacted with neuroticism, agreeableness and conscientiousness. Adjusting for all significant interactions (Table 4) attenuated the interaction of conscientiousness, which still remained marginally significant (B=-0.02, CI=[-0.04; 0.00], p<0.1). The interactions of neuroticism and agreeableness remained statistically significant (neuroticism x deviant peer affiliation B=-0.03, CI=[-0.05; -0.01], p<0.01; agreeableness x deviant peer affiliation B=-0.05, CI=[-0.07; -0.02], p<0.001) (Table 4).

The significant interactions were further examined by calculating simple slopes for each relevant personality trait at high (1 SD above the mean) and low (1 SD below the mean) levels of deviant peer affiliation (Table 5). As indicated by the absence of overlap between the point estimates and the CIs, the differences between the slopes were statistically significant at the +/-1 SD difference in deviant peer affiliation. High levels of deviant peer affiliation strengthened the associations of low neuroticism, low agreeableness and low conscientiousness with delinquency. The main effect of neuroticism was significant only at the high and mean, but not at the low, levels of deviant peer affiliation (p=0.762). The main effects of conscientiousness and agreeableness were significant also at low levels of deviant peer affiliation (Table 5).

Table 4
Associations between the FFM personality traits, the DS variables, and the DS x personality interaction effects with delinquency

	β	95% CI	
Peer deviance			
Extraversion	0.07***	0.05	0.10
Neuroticism	-0.04**	-0.06	-0.01
Agreeableness	-0.13***	-0.15	-0.11
Conscientiousness	-0.19***	-0.22	-0.17
Openness	0.00	-0.03	0.02
Peer deviance	0.48***	0.45	0.50
Extraversion * peer deviance			
Neuroticism * peer deviance	-0.03**	-0.05	-0.01
Agreeableness * peer deviance	-0.05***	-0.07	-0.02
Conscientiousness * peer deviance	-0.02*	-0.04	0.00
Openness * peer deviance			
Deviant attitudes			
Extraversion	0.19***	0.16	0.21
Neuroticism	0.01	-0.02	0.03
Agreeableness	-0.13***	-0.16	-0.11
Conscientiousness	-0.22***	-0.24	-0.19
Openness	0.05***	0.03	0.08
Deviant attitudes	0.29***	0.26	0.31
Extraversion * deviant attitudes	0.05***	0.03	0.08
Neuroticism * deviant attitudes			
Agreeableness * deviant attitudes	-0.05***	-0.08	-0.03
Conscientiousness * deviant attitudes			
Openness * deviant attitudes			
Neutralizing attitudes			
Extraversion	0.17***	0.14	0.19
Neuroticism	-0.01	-0.04	0.02
Agreeableness	-0.14***	-0.17	-0.11
Conscientiousness	-0.21***	-0.24	-0.19
Openness	0.04**	0.01	0.07
Peer deviance	0.29***	0.26	0.31
Extraversion * neutralizing attitudes	0.06***	0.03	0.08
Neuroticism * neutralizing attitudes			
Agreeableness * neutralizing attitudes	-0.04***	-0.07	-0.02
Conscientiousness * neutralizing attitudes			
Openness * neutralizing attitudes			

***p<0.001, **p<0.01, *p<0.1; DS, deviant socialization, β, regression B-coefficient, CI, confidence interval. Note: Separate models were fitted for each DS indicator.

Table 5
Simple slopes analysis

	Low			Mean			High		
	β	95% CI		β	95% CI		β	95% CI	
Peer deviance									
Neuroticism	-0.01	-0.04	0.03	-0.04**	-0.06	-0.01	-0.07***	-0.10	-0.03
Agreeableness	-0.09***	-0.12	-0.05	-0.13***	-0.15	-0.11	-0.18***	-0.21	-0.14
Conscientiousness	-0.17***	-0.21	-0.14	-0.19***	-0.22	-0.17	-0.21***	-0.25	-0.18
Deviant attitudes									
Extraversion	0.14***	0.10	0.17	0.19***	0.16	0.21	0.24***	0.20	0.28
Agreeableness	-0.08***	-0.12	-0.04	-0.13***	-0.16	-0.11	-0.19***	-0.22	-0.15
Neutralizing attitudes									
Extraversion	0.11***	0.08	0.15	0.17***	0.14	0.19	0.22***	0.19	0.26
Agreeableness	-0.10***	-0.13	-0.06	-0.14***	-0.17	-0.11	-0.18***	-0.22	-0.15

***p<0.001, **p<0.01. β, regression B-coefficient, CI, confidence interval.

3.3.2 Personality x criminogenic attitudes. The next interaction analyses tested the interaction effects of personality with deviant and neutralizing attitudes (Table 4). Similar patterns of interactions were observed with both attitude variables. In single-interaction analyses, the attitude variables interacted with extraversion and agreeableness (Appendix C, Tables C3–C4). Adjusting for both interactions, they remained statistically significant (deviant attitudes x extraversion B=0.05, CI=[0.03; 0.08], p<0.001; deviant attitudes x agreeableness B=-0.05, CI=[-0.08; -0.03], p<0.001; neutralizing attitudes x extraversion B=0.06, CI=[0.03; 0,08], p<0.001, neutralizing attitudes x agreeableness B=-0.04, CI=[-0.07; -0.02], p<0.001). In the slope analyses, the differences between the slopes for both extraversion and agreeableness were statistically significant at +/-1 SD difference in the attitudinal scores (Table 5). Stronger deviant and more neutralizing attitudes strengthened the associations of high extraversion and low agreeableness with delinquency.

4 DISCUSSION

The analysis of the data from the FSRD-12 demonstrates that personality may provide insights into the etiology of delinquency during adolescence. High extraversion, low agreeableness and low conscientiousness were associated with higher levels of engagement in delinquent behavior. In addition, low neuroticism was weakly associated with delinquent conduct. Openness was not associated with delinquency. Deviant peer affiliation and criminogenic attitudes partially mediated the associations of conscientiousness, agreeableness and extraversion with delinquency. The association between neuroticism and delinquency was fully mediated via criminogenic attitudes. Deviant peer affiliation strengthened the associations of low neuroticism, low agreeableness, and low conscientiousness with delinquency, the latter to a somewhat smaller extent. Finally, both deviant and neutralizing attitudes strengthened the associations of low agreeableness and high extraversion with delinquent conduct.

4.1 Methodological considerations

The current results need to be taken with certain methodological limitations. First, the data was cross-sectional, making it impossible to draw inferences regarding causality. Delinquency and the DS factors might contribute to personality development/change during adolescence, yet the biological basis of personality provides plausibility for the hypothesized direction. Also, the association of delinquency with deviant peer affiliation and criminogenic attitudes may be due to reverse causality; that is, a given individual's delinquent conduct may promote self-selection into a deviant peer context (e.g., Glueck & Glueck, 1950; Gottfredson & Hirschi, 1990), or may shape attitudes (e.g., Rebellon, Manasse, Van Gundy, & Cohn, 2014). These associations most likely work in both directions, to some extent (e.g., Kandel, 1978; Thornberry, 1987). Clearly, more research based on personality, using longitudinal data, is needed.

Other objections concern the measures. The Finnish version of the BFI-S questionnaire has not been validated, but the BFI-S has demonstrated acceptable reliability and validity in a

German sample (Hahn et al., 2012). However, the reliabilities of agreeableness and conscientiousness remained low in this study, which limits the conclusions that can be drawn. Also, the use of BFI-S might make it impossible to refer directly to FFM, due to its limited convergent validity with the full FFM framework. I discuss this issue further in the next section; see also Hahn et al., 2012. In addition, using indirect self-report estimates of peer deviance (based on respondents' perceptions) creates a risk of bias; adolescents may overestimate the delinquency of their peers (but see Young & Weerman, 2013), based on factors such as perceptions of similarity (see e.g., Aseltine, 1995; Gottfredson & Hirschi, 1990), or rotating changes in co-offender casts (Pratt et al., 2010; see McGloin, Sullivan, Piquero, & Bacon, 2008; Warr, 2002). Indeed, it is clear that the current results should be replicated using more objective measures of peer deviance. Finally, it should be noted that the delinquency variable used in this study was highly skewed, and hence does not perfectly meet the assumptions of the methods that were used (i.e., maximum likelihood & ordinary least squares). However, the square root transformation did normalize the residual distribution to a notable degree.

Despite these limitations, the current study has several methodological strengths. First, the participants were a representative sample of Finnish 9th graders. The sample size was large, and the statistical power was sufficient to detect very small effects. In addition, the outcome variable was based on a representative variety of delinquent behaviors. The graded response model made it possible to place the items on a realistically continuous scale, which made the measurement more precise. This let me avoid the shortcomings of commonly used summative scales, and made the outcome measure more suitable for maximum likelihood/ordinary least squares based analyses (Osgood et al., 2002). Finally, the SEM-based path analysis provided a way to assess the strengths of single pathways, and to determine the mediation proportions. The path coefficients presented in the section 3.2 were robust; the results remained virtually identical when the SEM was adjusted for the significant interactions.

4.2 Pathways to delinquency

In line with the hypotheses and the results of earlier meta-analyses (Jones et al., 2011; Miller & Lynam, 2001), low conscientiousness and low agreeableness were associated

with higher delinquency. This finding, along with prior evidence, depicts delinquent individuals as careless, undisciplined and non-conforming, and prone to antagonism and hostility, which taps well into the self-control theory's description of crime-proneness (Miller & Lynam, 2001; cf. Gottfredson & Hirschi, 1990). In contrast to prior meta-analytic findings (Jones et. al, 2011; Miller & Lynam, 2001), conscientiousness had a stronger effect on delinquency than agreeableness. Although the low reliability of the BFI-S measures limits firm conclusions, the dominant effect of conscientiousness is in line with the central premise of the self-control theory (Gottfredson & Hirschi, 1990): it primarily reflects the individual's ability to hold back from acting out on impulse (Hogan & Ones, 1997).

In addition, low conscientiousness and low agreeableness were associated with delinquency indirectly via deviant peer affiliation and criminogenic attitudes. Together these factors explained 48% and 44% of the associations of conscientiousness and agreeableness with delinquency, respectively. These results converge with the study by Heaven et al. (2000) demonstrating related pathways between Eysenckian psychoticism and delinquency. I expected these associations based primarily on prior findings on self-control (e.g., Longshore, et al., 2004, 2005; Mason & Windle, 2002; Wright et al., 2001). My results provide evidence for the hypothesis that traits sharing an overlap with self-control might operate on delinquency via similar intermediate mechanisms (see e.g., Jones et al., 2011; Miller & Lynam, 2001)

Deviant peer affiliation was the dominant mediator (based on full mediating paths) for the effects of both agreeableness and conscientiousness; this finding highlights the role of social selection in bringing out the dispositional risks of delinquency (see Shiner & Caspi, 2003; Wright et al., 2001). However, this result was due to the dominant effect that deviant peer affiliation had on delinquency. On standardized measures, disagreeable and less conscientious individuals were more likely to hold criminogenic attitudes than to affiliate with deviant peers. On one hand, this may reflect differences in their tendency to hold non-normative beliefs or to reject conventional norms (e.g., Hogan & Ones 1997; Jensen-Campbell & Graziano, 2001). Also, adolescents who are disagreeable and less conscientious may lack interpersonal skills and thus be less attractive affiliates for their peers (Jensen-Campbell, Adams, Perry, Workman, Furdella, & Egan, 2002; Jensen-Campbell & Graziano, 2001; Jensen-Campbell & Malcom, 2007). One explanation for the

weaker path to affiliation with deviant peers may be rejection, even by deviant peers (see Chapple, 2005; but cf. Moffitt, 1993).

In contrast to the hypothesis, low, rather than high, neuroticism exhibited a weak association with delinquency. It is worth noting that in earlier studies, different facets of neuroticism have shown a mixed pattern of associations with antisocial behavior. High hostility and high impulsiveness have emerged as the strongest facet-level correlates of antisocial behavior, but *low* anxiety has been found to exert a small yet significant effect (Jones et al., 2011; see also Miller & Lynam, 2001). In a German sample, in turn, Hahn et al. (2012) found that BFI-S neuroticism correlated most strongly with the facets of anxiety and vulnerability to stress, but more weakly with hostility and impulsiveness. Thus, the unexpected direction of the association between neuroticism and delinquency was likely to reflect the BFI-S measure. In line with this reasoning, Lykken (1995) has argued that excessive emotional stability (cf. low neuroticism) may place an individual at risk for antisocial behavior if that person lacks the fear that prevents most people from behaving in antisocial ways. In contrast, highly neurotic individuals are prone to withdrawal or avoidance behavior; they tend to withdraw from stressful, unpleasant or uncertain situations (Watson, Wiese, Vaidya, & Tellegen, 1999). This thinking likely also applies to delinquency.

The association of neuroticism with delinquency was fully mediated via criminogenic attitudes; less neurotic individuals were prone to deviant, and to a lesser degree neutralizing attitudes. These links were unexpected, especially that between emotional stability (i.e. low neuroticism) and explicitly *oppositional* (i.e. *deviant*) attitudes. Given that adolescence is a period of rebellion against prevailing authority (e.g., Salmi, 2004), these results might reflect, to some extent, the fact that adolescents have the opportunity, and the age-typical tendency, to adopt non-normative attitudes. One might expect that adopting oppositional or conflicting attitudes could provoke stress, which could explain why the less anxious, and more stress-resistant adolescents took them on. Conversely, the strength of the inverse pathway for highly neurotic individuals may be due to that anti-deviant attitudes imply a strong determinant to avoid/inhibit stress-provoking behaviors, such as delinquency (see Akers et al., 1979). However, further research on these associations is needed before these possibilities can be assessed.

The association between high extraversion and delinquency has not been observed previously. I hypothesize that it might partly reflect the higher sociability of extraverted individuals (see also Hahn et al., 2012); delinquency is predominantly group behavior (Reiss, 1986; Warr, 2002), which may make it uniquely attractive to extraverted adolescents (see also Wilkowski & Ferguson, 2014). Also, individuals high on extraversion are sensitive to positive emotions and signals of reward (Watson & Clark, 1992; Watson et al., 1999). If delinquency is regarded as age-normative, or expected, behavior (e.g., Moffitt, 1993), it may to some extent have a social reinforcement value, which highly extraverted adolescents might be especially prone to detect. In addition, earlier studies have found that sensation-seeking, a central facet of extraversion, is linked to deviant behavior (e.g., Jones & Lynam, 2008; Mann, Kretsch, Tackett, Harden, & Tucker-Drob, 2015; see also Lynam & Miller, 2004). However, extraversion on the BFI-S has previously demonstrated a rather weak correlation with sensation-seeking (Hahn et al., 2012). Thus, it might play a less relevant role in explaining the association in the present sample.

Furthermore, the deviant socialization factors explained 62% of the association of extraversion with delinquency. Specifically, highly extraverted individuals were likely to affiliate with deviant peers. This pathway indeed emerged as the strongest indirect pathway included in the model, suggesting that social factors may play a specifically prominent role in translating extraversion into delinquent behavior. Also, extraverted adolescents were uniquely more likely to hold neutralizing than deviant attitudes. This tendency may dovetail with emotional sensitivity; due to their proneness to positive emotions, extraverted individuals might be resistant to explicitly oppositional (i.e., deviant) attitudes. By contrast, neutralizations, which downplay the negative evaluation of delinquency, may lead adolescents to see delinquency as normative, or socially sanctioned behavior (see Kivivuori, 2013; cf. also Carver, 2003).

4.3 Vulnerability to deviant socialization factors

4.3.1 Deviant peers and personality. To date, evidence on individual susceptibility to deviant peer influence has been mixed. Several studies have found that either low (Holt et al., 2011; Wright et al., 2001; see also Gibson & Wright, 2001) or high self-control

(Hinduja & Ingram, 2008; Meldrum et al., 2009; see also Thomas & McGloin, 2013; Vitulano et al., 2009) exacerbates the criminogenic risk of associating with deviant peers, or failed to observe either result (Yarborough et al., 2012). My results are broadly in line with findings that deviant peers are a stronger risk for those who have a higher criminal propensity (i.e., low self-control; Holt et al., 2011; Wright et al., 2001); affiliation with deviant peers was associated with delinquency particularly strongly among adolescents who scored low on neuroticism and agreeableness. The interaction between deviant peer affiliation and neuroticism was again in an unexpected direction, but it was plausible given the scope of the BFI-S measure (see Hahn et al., 2012). Unexpectedly, the interaction effect between deviant peer affiliation and conscientiousness was only marginally significant. To be specific, this effect was attenuated in the model adjusted for all significant interactions. Given the relatively high correlation between agreeableness and conscientiousness, it seems likely that the interaction tapped into shared variance between these traits, yet predominantly into agreeableness.

Some have hypothesized that deviant peers exacerbate the risk of delinquency particularly in individuals with a higher dispositional criminal propensity, as these individuals may experience their social environments in ways that can promote deviant conduct (Caspi & Moffitt, 1995; Wright et al., 2001). At a proximate level of explanation, this hypothesis fits well for disagreeable individuals. For instance, disagreeable individuals are biased to attend to antisocial stimuli (Wilkowski, Robinson, & Meier, 2006), and less able to self-regulate their negative cognition (Meier, Robinson, & Wilkowski, 2006). They are prone to respond aggressively to aggressive cues (Meier et al., 2006), and may favor destructive responses to interpersonal conflicts (Graziano, Jensen-Campbell, & Hair, 1996; Jensen-Campbell, Gleason, Adams, & Malcom, 2003). For such individuals, deviant peers may well provide a conflictual context where they encounter more antisocial stimuli and more cues to hostile attributions, which may promote that their antagonism translates into deviant behavior. Also, disagreeable individuals experience less negative affect when they engage in antagonistic behavior than those who score high on agreeableness (Côté & Moskowitz, 1998); this might facilitate their following the delinquent example of their peers.

The interaction between deviant peers and neuroticism might reflect related, yet distinct affective responses. One might expect that less neurotic individuals experience less anxiety

and distress as they react to deviant behavior among their peers (cf. Hahn et al., 2012); this may promote that they absorb peer influence. On the other hand, individuals who score low on negative affectivity, a dispositional dimension akin to neuroticism, are characteristically motivated by social approval and affiliation (Watson & Clark, 1984). Such motivation might make less neurotic individuals more likely to conform to the delinquent behavior of peers. Deviant peers might also play a relevant role in articulating the attitudinal mediation pathway of neuroticism to delinquency discussed above (4.2). Further research is yet needed to test this possibility (i.e. moderated mediation) in detail. It is worth noting that the association between neuroticism and delinquency depended strongly on peer context: 1 SD increase in deviant peer affiliation from the mean level increased the effect size of neuroticism from 0.08 to 0.14. Furthermore, the association was non-significant at low levels of exposure to deviant peers; this suggests that low neuroticism might predict delinquency only when an individual is sufficiently exposed to deviant peers.

An influential criminological hypothesis concerned with interaction builds on mere opportunity; higher access to criminal opportunities is expected to accentuate the dispositional risks of delinquency (Hay & Forrest, 2008; Ousey & Wilcox, 2007; see also Gottfredson & Hirschi, 1990). As deviant peers may promote such access, this hypothesis would predict that the risks associated with the different personality traits should respond equally to the opportunities peers may offer (cf. Wright et al., 2001). It is of note that the interaction effect between deviant peers and conscientiousness was unexpectedly weaker than those observed with neuroticism and agreeableness. In addition, no interaction effect was observed for extraversion. Though preliminary, my findings suggest that the moderating effect of deviant peers is not based on mere opportunity, or on a uniform criminal propensity. Instead, the influence of deviant peers might tap into more refined psychological processes, such as individual responses to socially-induced negative affect. Such phenomena might provide interesting directions for future research.

4.3.2 Criminogenic attitudes and personality. Unexpectedly, personality exhibited different patterns of interaction effects with criminogenic attitudes than with deviant peer affiliation. Highly deviant and neutralizing attitudes were associated with delinquency particularly strongly in disagreeable and extraverted individuals, but did not moderate the effects of neuroticism and conscientiousness on delinquency. Akers et al. (1979; Akers, 2009) argue that criminogenic attitudes function as discriminative stimuli to deviance. It is

possible that attitudes further bias antagonistic information and affect processing among disagreeable individuals (cf. e.g. Meier et al., 2006; Wilkowski et al., 2006). However, it should be noted that the correlations between agreeableness and criminogenic attitudes were relatively high; it is possible that the attitudinal measures merely outlined the agreeableness dimension further, and hence the interaction needs to be taken with reservation.

The interaction with extraversion was not expected. Extraversion is a trait characterized by active engagement with one's surroundings (Shiner & Caspi, 2003) The current results may suggest that attitudes confer a risk of delinquency specifically when coupled with a tendency to approach and act. In addition, they might inform extraverted individuals' anticipation that delinquent behavior will be reinforced socially, or they may promote that such individuals befriend deviant peers (see section 4.2). From the perspective of social learning, the stronger effects of criminogenic attitudes among highly extraverted individuals highlight an additional concern. As found in the path analysis, extraverted individuals were particularly likely to have deviant affiliates, but they were relatively disinclined to take on criminogenic attitudes. Still, it is crucial to note that peer groups are a central socializing agent for adolescents (e.g., Akers et al., 1979). In this perspective, the orientation towards deviant affiliates may place extraverted individuals specifically at risk as these affiliates might be expected to enhance the adoption of criminogenic attitudes; this, in turn, might amplify the risk of delinquency.

4.4 Significance

The present study provides novel evidence on the role that personality plays in the etiology of delinquency. To some extent, my results validate findings from studies that consider self-control. That is, the risks indexed by conscientiousness and agreeableness fall neatly within the self-control perspective. However, personality may yield relevant insights outside the scope of self-control. Notably, my findings from the FSRD-12 suggest that high extraversion and specific aspects of low neuroticism may be relevant risk factors for adolescent delinquency. Moreover, it appears that these dispositional factors operate in a complex way in the context of deviant socialization. The FFM traits may set off unique DS pathways that pull individuals towards the risk of deviant conduct; and they may provide

differential fits to the interaction hypotheses. My findings clearly suggest that the uniform measures of criminal propensity may fail to grasp the crucial details of these transactions.

In terms of intervention, a more complex take on the individual determinants of delinquency deserves attention. First, during adolescence, the individual-level risks may tap into a wider variety of psychological dispositions than would be predicted by a narrow focus on self-control (cf. Moffitt, 1993). This is clearly a crucial area to explore, in order to identify the individuals most at risk and target support to them. A more detailed grasp of the individual determinants may also inform about *how* to target these individuals (cf. Miller & Lynam, 2001). My results demonstrate that the factors involved in deviant socialization may distinctively tap into different dispositions; in practice, across individuals, the same risk factors are likely to involve diverse psychological motives. Advancing the knowledge about the underlying phenomena is undoubtedly crucial in order to plan interventions to set the right focus. Given the effect sizes of the DS factors, it is also clear that targeting these risks is central.

Two final issues seem relevant to address. First, the age-normative emergence of delinquency may make adolescents specifically vulnerable to environmental risks. That is, they likely promote delinquency not only in highly crime-prone individuals, but also in individuals without clear-cut propensities (see Moffitt, 1993). This establishes a rationale for personality-based viewpoints; by addressing a fuller range of normal psychological characteristics, personality may be able to elucidate the adolescence-typical development of delinquency under a diversity of criminogenic contexts. Second, it is central to note that the concept of personality does not only refer to risk. Clear evidence suggests that high agreeableness and conscientiousness, for instance, may buffer the risks of deviant conduct (see e.g., Côté & Moskowitz, 1998; Graziano et al., 1996; Jensen-Campbell & Graziano, 2001; Jensen-Campbell, Knack, Waldrip, Campbell, 2007; Meier et al., 2006; see also Gardner, Dishion, & Connell, 2008); moreover, even the dispositions that are indexed with risk may mark heightened responsiveness to positive environmental influences (Chen & Jacobson, 2013; see also Belsky & Pluess, 2009). Advancing this knowledge may have direct implications for interventions based on peer networks, for instance; in practice, they could prevent at-risk individuals from socializing together or could prevent the spread of criminogenic attitudes (see Weerman, 2011). Also, this knowledge can help us to combine

protective factors in adolescent contexts to decrease the risks and promote individual resiliency.

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Appendix A

The delinquency questionnaire

The delinquency scale was based on 17 delinquent behaviors. Respondents were asked to say how many times they had done each of them, as follows.

During the last 12 months, how many times have you…

skipped school for one day without permission
written/painted graffiti on walls, cars, bus shelters etc.
damaged or destroyed property belonging to a school
damaged or destroyed property belonging to someone other than a school
stolen something from a shop/store
stolen something from a school
stolen a motor vehicle
stolen something else
broken into an apartment house or other building
bullied someone
been involved in a fight in a public place
beaten someone
threatened/frightened someone to be able to steal something from him/her
carried a weapon
driven while intoxicated
used/tried marijuana or hash
used/tried OTHER drugs than marijuana or hash

The corresponding items in Finnish (used in the FSRD-12)

Kuinka monta kertaa viimeisen 12 kk aikana olet…

ollut poissa koulusta kokonaisen päivän ilman lupaa
kirjoittanut tai maalannut kirjoituksia tai graffiteja seiniin, busseihin, katoksiin jne.
tahallisesti vahingoittanut tai tuhonnut koulun omaisuutta
tahallisesti vahingoittanut tai tuhonnut muuta kuin koulun omaisuutta
varastanut kaupasta tai kioskista
varastanut jotain koulusta
varastanut moottoriajoneuvon
tehnyt jonkun muun varkauden kuin edellä mainitut
murtautunut sisään johonkin asuntoon tai muuhun rakennukseen
kiusannut toista nuorta
osallistunut tappeluun julkisella paikalla
hakannut jonkun
uhannut jotain ihmistä hakkaamalla tai aseella, jotta saisit häneltä rahaa tai jonkin arvokkaan esineen
pitänyt asetta tai aseeksi tarkoittamaasi välinettä mukana
ajanut humalassa
käyttänyt tai kokeillut marihuanaa tai hasista
käyttänyt MUITA huumeita kuin marihuanaa tai hasista

Appendix B

BFI-S personality inventory

The BFI-S included 15 statements, three for measuring each FFM trait. Respondents were asked to rate themselves on a five-point scale (1 = completely disagree, 5 = completely agree). The statements marked by asterisk (*) are reversed.

E, extraversion, N, neuroticism, A, agreeableness, C, conscientiousness, O, openness

I see myself as someone who …

is communicative, talkative.	E
is diligent.	C
is original, comes up with new ideas.	O
has a forgiving nature.	A
worries a lot.	N
is quiet and reserved. *	E
tends to be lazy. *	C
has an active imagination.	O
is considerate and kind to others.	A
is relaxed, handles stress well. *	N
is outgoing, sociable.	E
does a thorough job.	C
who likes to reflect upon things.	O
is sometimes somewhat rude to others. *	A
gets tense and nervous easily.	N

The corresponding statements in Finnish (used in the FSRD-12)

Olen puhelias.
Olen huolellinen.
Olen omaperäinen, keksin paljon uusia ajatuksia.
Annan helposti anteeksi muille.
Huolestun ja murehdin herkästi.
Olen yleensä hiljainen ja varautunut. *
Olen usein laiska. *
Minulla on vilkas mielikuvitus.
Olen huomaavainen ja ystävällinen lähes kaikkia kohtaan.
Olen rento, selviän stressistä helposti. *
Olen sosiaalinen ja ulospäinsuuntautunut.
Teen tehtäväni sinnikkäästi loppuun saakka.
Tykkään pohdiskella ja miettiä asioita.
Olen joskus tyly muita kohtaan. *
Jännitän ja hermostun herkästi.

Appendix C

Table C1
Univariate associations between the FFM personality traits and delinquency

	β	95 % CI	
Extraversion	0.16***	0.14	0.19
Neuroticism	-0.06***	-0.09	-0.03
Agreeableness	-0.25***	-0.27	-0.22
Conscientiousness	-0.32***	-0.34	-0.29
Openness	-0.02	-0.05	0.01

***p<0.001. β, regression B-coefficient; CI, confidence interval.
Separate models were fitted for each trait, adjusting for sex and age.

Appendix C (continued)

Tables C2–C4 give the results of the single-trait interaction models (Models 1–5), along with the final model adjusted for all significant DS x personality trait interaction effects (Model 6). The final model is identical to the model presented in the section on interaction effects (Table 4).

Table C2
Analysis of the interaction effects between the FFM personality and peer deviance

	Model 1			Model 2			Model 3		
	β	95% CI		β	95% CI		β	95% CI	
Extraversion	0.08***	0.05	0.10	0.07***	0.05	0.10	0.07***	0.05	0.10
Neuroticism	-0.04**	-0.06	-0.01	-0.04**	-0.06	-0.01	-0.04**	-0.06	-0.01
Agreeableness	-0.13***	-0.15	-0.11	-0.13***	-0.15	-0.11	-0.13***	-0.15	-0.11
Conscientiousness	-0.19***	-0.22	-0.17	-0.19***	-0.22	-0.17	-0.19***	-0.22	-0.17
Openness	0.00	-0.03	0.02	0.00	-0.03	0.02	0.00	-0.03	0.02
Peer deviance	0.48***	0.45	0.50	0.48***	0.45	0.50	0.48***	0.45	0.50
Extraversion * peer deviance	0.02	-0.01	0.04						
Neuroticism * peer deviance				-0.031**	-0.05	-0.01			
Agreeableness * peer deviance							-0.05***	-0.08	-0.03
Conscientiousness * peer deviance									
Openness * peer deviance									

	Model 4			Model 5			Model 6		
	β	95% CI		β	95% CI		β	95% CI	
Extraversion	0.07***	0.05	0.10	0.07***	0.05	0.10	0.07***	0.05	0.10
Neuroticism	-0.04**	-0.06	-0.01	-0.04**	-0.06	-0.01	-0.04**	-0.06	-0.01
Agreeableness	-0.13***	-0.16	-0.11	-0.13***	-0.15	-0.11	-0.13***	-0.15	-0.11
Conscientiousness	-0.19***	-0.22	-0.17	-0.19***	-0.22	-0.17	-0.19***	-0.22	-0.17
Openness	0.00	-0.02	0.03	0.00	-0.03	0.02	0.00	-0.03	0.02
Peer deviance	0.48***	0.45	0.50	0.48***	0.46	0.50	0.48***	0.45	0.50
Extraversion * peer deviance									
Neuroticism * peer deviance							-0.03**	-0.05	-0.01
Agreeableness * peer deviance							-0.05***	-0.07	-0.02
Conscientiousness * peer deviance	-0.03**	-0.06	-0.01				-0.02*	-0.04	0.00
Openness * peer deviance				-0.01	-0.03	0.01			

*** p<0.001; **p<0.01, *p<0.1. β, regression B-coefficient, CI, confidence interval.

Appendix C (continued)

Table C3
Analysis of the interaction effects between the FFM personality and deviant attitudes

	Model 1			Model 2			Model 3		
	β	95% CI		β	95% CI		β	95% CI	
Extraversion	0.18***	0.16	0.21	0.18***	0.15	0.21	0.18***	0.16	0.21
Neuroticism	0.00	-0.03	0.03	0.00	-0.03	0.03	0.00	-0.03	0.03
Agreeableness	-0.13***	-0.16	-0.11	-0.13***	-0.16	-0.11	-0.13***	-0.16	-0.11
Conscientiousness	-0.21***	-0.24	-0.19	-0.21***	-0.24	-0.19	-0.22***	-0.24	-0.19
Openness	0.05***	0.03	0.08	0.06***	0.03	0.08	0.06***	0.03	0.09
Deviant attitudes	0.29***	0.26	0.32	0.29***	0.26	0.31	0.28***	0.26	0.31
Extraversion * attitudes	0.04**	0.02	0.07						
Neuroticism * attitudes				-0.01	-0.04	0.01			
Agreeableness * attitudes							-0.05***	-0.07	-0.02
Conscientiousness * attitudes									
Openness * attitudes									

	Model 4			Model 5			Model 6		
	β	95% CI		β	95% CI		β	95% CI	
Extraversion	0.18***	0.16	0.21	0.18***	0.15	0.21	0.19***	0.16	0.21
Neuroticism	0.00	-0.03	0.03	0.00	-0.03	0.03	0.01	-0.02	0.03
Agreeableness	-0.14***	-0.16	-0.11	-0.13***	-0.16	-0.11	-0.13***	-0.16	-0.11
Conscientiousness	-0.21***	-0.24	-0.19	-0.21***	-0.24	-0.19	-0.22***	-0.24	-0.19
Openness	0.06***	0.03	0.08	0.06***	0.03	0.08	0.05***	0.03	0.08
Deviant attitudes	0.29***	0.26	0.31	0.29***	0.26	0.32	0.29***	0.26	0.31
Extraversion * attitudes							0.05***	0.03	0.08
Neuroticism * attitudes									
Agreeableness * attitudes							-0.05***	-0.08	-0.03
Conscientiousness * attitudes	-0.02	-0.04	0.01						
Openness * attitudes				0.01	-0.02	0.03			

*** p<0.001, **p<0.01, β, regression B-coefficient, CI, confidence interval.

Appendix C (continued)

Table C4
Analysis of the interaction effects between the FFM personality and neutralizing attitudes

	Model 1			Model 2			Model 3		
	β	95% CI		β	95% CI		β	95% CI	
Extraversion	0.17***	0.14	0.19	0.16***	0.14	0.19	0.16***	0.14	0.19
Neuroticism	-0.01	-0.04	0.01	-0.02	-0.04	0.01	-0.01	-0.04	0.02
Agreeableness	-0.14***	-0.17	-0.11	-0.14***	-0.17	-0.12	-0.14***	-0.17	-0.12
Conscientiousness	-0.21***	-0.24	-0.19	-0.21***	-0.24	-0.19	-0.21***	-0.24	-0.19
Openness	0.04**	0.01	0.07	0.04**	0.02	0.07	0.05**	0.02	0.07
Neutralizing attitudes	0.28***	0.26	0.31	0.29***	0.26	0.31	0.29***	0.26	0.31
Extraversion * attitudes	0.05***	0.03	0.08						
Neuroticism * attitudes				-0.01	-0.03	0.01			
Agreeableness * attitudes							-0.04**	-0.06	-0.01
Conscientiousness * attitudes									
Openness * attitudes									

	Model 4			Model 5			Model 6		
	β	95% CI		β	95% CI		β	95% CI	
Extraversion	0.16***	0.14	0.19	0.16***	0.14	0.19	0.17***	0.14	0.19
Neuroticism	-0.01	-0.04	0.01	-0.02	-0.04	0.01	-0.01	-0.04	0.02
Agreeableness	-0.14***	-0.17	-0.12	-0.14***	-0.17	-0.12	-0.14***	-0.17	-0.11
Conscientiousness	-0.21***	-0.24	-0.19	-0.21***	-0.24	-0.19	-0.21***	-0.24	-0.19
Openness	0.04**	0.02	0.07	0.04**	0.02	0.07	0.04**	0.01	0.07
Neutralizing attitudes	0.29***	0.26	0.31	0.29***	0.26	0.31	0.29***	0.26	0.31
Extraversion * attitudes							0.06***	0.03	0.08
Neuroticism * attitudes									
Agreeableness * attitudes							-0.04***	-0.07	-0.02
Conscientiousness * attitudes	-0.01	-0.04	0.01						
Openness * attitudes				0.00	-0.02	0.02			

*** p<0.001, ** p<0.01; β, regression B-coefficient, CI, confidence interval.